

Land Mobile Satellite Antenna Development at JPL*

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JPL has developed several mobile-vehicular antenna systems for satellite service throughout the last decade. The frequency bands cover UHF through Ka-band, and the antennas vary from high-gain with automatic satellite-tracking to omni-directional. The satellite-tracking antennas involve either phased array or mechanical steering, or a hybrid combination. The antennas all support direct mobile satellite links from a vehicle on the move.

The most recently developed antenna is the small reflector antenna system for the NASA ACTS Mobile Terminal (AMT). The AMT will demonstrate voice, data and video communication from a vehicle while on the move, via the K and Ka-band ACTS satellite. The small reflector antenna mounts on the roof of the vehicle and provides 22 dBW EIRP transmit power density at 30 GHz and -8 dB/K receive sensitivity (G/T) at 20 GHz, with an overall antenna size of 23 cm diameter and 10 cm height. With an antenna beamwidth of 10 deg the antenna system incorporates closed-loop satellite tracking to ensure that communication is maintained as the vehicle moves about.

An active array antenna with MMIC transmit power amplifiers and receive low-noise amplifiers integrated into the array is currently under development and will supercede the small reflector antenna in the AMT.

Antenna development for L-band includes the novel Microstrip Yagi array which provides 20 dBW EIRP transmit power density and -13 dB/K receive sensitivity (G/T) using microstrip patches to produce a circularly polarized beam directed away from the array broadside. The height is only 4 cm.

Further details regarding these antenna systems, as well as overviews of others developed by JPL will be presented.

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